REMARKS

Claims 1-33 are pending in this application. By this Amendment, claim 18 has been amended into independent form. Support for the amendment to claim 18 is found at least at original claim 12. Claims 7-17 and 19-33 have been previously withdrawn by the Examiner. Applicants respectfully request that claims 12-17 be rejoined upon the allowance of claims 1-6 and 18. Claims 7-11 and 19-33 are drawn to non-elected subject matter and may be canceled by the Examiner upon allowance of the application. No new matter has been added.

Claims 1-6 and 18 are rejected under 35 U.S.C. §103(a) as being unpatentable over either the article "Anomalous crystallization mechanism in the synthesis of nanocrystalline ZSM-5" to Van Grieken et al. in view of EP 0 952 152 to Li et al. or over WO 97/03019 to Verduijn in view of Li.

Claims 1 and 18 recite, among other features, an alkali metal and alkaline earth metal content of not more than 150 ppm. At least this feature of the independent claims cannot reasonably be considered to be suggested by the applied citations.

The Office Action asserts that Van Grieken and Verdujin suggest pentasil materials made in low basicity environments in the absence of alkali or alkaline earth materials, which would result in an alkali metal or alkaline earth metal content, as claimed. Applicants respectfully disagree with the assertion.

The zeolite preparation suggested in Van Grieken is certainly not performed in the absence of alkali or alkaline earth materials. Rather, Van Grieken explicitly discloses, at page 137, second column, lines 8-9 of the paragraph beginning with "Table 1 shows..." TPAOH with alkaline impurities. Moreover, at page 139, second column, first full paragraph, Van Grieken suggests compositions "free of Na^+ cations," yet the TPAOH solution used has a "minimum alkali content."

In general, regarding the use of tetraalkyl ammonium hydroxide solutions in the synthesis of pentasil type zeolites, it is important to note that these solutions normally contain a certain

amount of alkali metal and/or alkaline earth metal impurities inherent to the method for their production. Accordingly, unless stated otherwise, the use of such solutions in the production of zeolites always involves varying amounts of these impurities. Consequently, as shown in van Grieken, it may not be concluded that the exclusive use of a tetraalkyl ammonium hydroxide solution as a base in the synthesis of a pentasil type zeolite would lead to a product devoid of alkali and/or alkaline earth metal.

Similarly, although Verdujin suggests, at page 4, lines 17-18, that in some synthesis procedures it is preferred not to purposefully add potassium or sodium, all synthesis procedures employ tetraalkyl ammonium hydroxide solutions, which comprise alkali or alkaline earth metal impurities. For example, as set forth at page 10, lines 17-18, tetramethyl ammonium hydroxide contains KOH as an impurity. As a result, even though no potassium was purposefully added, example 3 at the bottom of page 10 contains 0.47 mol of K_2O:Al_2O_3, which cannot reasonably be considered to correspond to an insubstantial amount.

Finally, Li fails to suggests a synthetic procedure for the preparation of the pentasil zeolites disclosed therein. Instead, as set forth at paragraph [0020], the zeolites suggested in Li have been obtained from commercial sources. Consequently, the zeolites suggested therein were produced according to the methods of the related art, i.e., using conventional tetraalkyl ammonium hydroxide solutions and/or tetraalkyl ammonium salts in combination with an alkali metal and/or alkaline earth metal hydroxide as the base (see page 3, paragraphs [0023] and (0024]). Accordingly, the pentasil zeolites suggested in Li have to be considered to contain a conventional amount of alkali metal and/or alkaline earth metal.

Therefore, in view of the above, all of the applied citations suggest pentasil zeolites containing a certain content of alkaline metal and/or alkaline earth metal. In particular, none of said documents suggests a zeolite material according to the present invention, which displays an extremely low content of alkali and alkaline earth metal compounds.

Moreover, the claimed subject matter is drawn to a zeolite material of the pentasil type with improved properties, which is achieved by the specific pentasil type zeolite materials as

recited in claims 1 and 18. Thus, it has surprisingly been found that due to the combined effect of a very low content of alkaline metal and alkaline earth metal that does not exceed 150 ppm, a high Si : Al ratio of from 250 to 1500, and the fact that the zeolite material particles have a specific size and morphology, said zeolite material displays higher catalytic activities and selectivities compared to the related art.

By way of non-limiting example, the surprising technical effect of the present invention is demonstrated in the specification in view of the improvements achieved when applied to the catalytic activity and selectivity in the production of triethylenediamine (TEDA) from piperazine (PIP) and ethylenediamine (EDA). Thus, as shown in Example 6 and in Comparative Example 3 of the present application on pages 36 and 39, respectively, a zeolite material of the pentasil type having a sodium content of less than 150 ppm (see Example 4 on pages 35 and 36, and results in Example 3) achieves a higher conversion of EDA than a zeolite material having an alkaline metal content which exceeds 150 ppm (see Comparative Example 1 on pages 38 and 39, and results in Comparative Example 3).

Further, as shown in Comparative Examples 4 and 5 on pages 39 and 40, respectively, a zeolite material having rounded cuboid primary particles with edge lengths exceeding 1 μm lead to a significantly poorer TEDA selectivity than a zeolite material with primary particles of a size and morphology according to the present invention (see results in Examples 3, 6, and 9, respectively).

Accordingly, the surprising technical effect of a zeolite material as claimed is not rendered obvious by the applied citations, either when considered alone or in any permissible combination. In particular, there is no hint or suggestion in the applied citaitons with respect to a zeolite material of the pentasil type having the combination of all of the features recited in the pending claims.

In view of the above amendment, Applicants believe the pending application is in condition for allowance.

Applicants believe no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 22-0185, under Order No. 13156-00051-US1 from which the undersigned is authorized to draw.

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Respectfully submitted,

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